NO. 180 ROTATION PERIOD FOR A SUBSURFACE SOURCE IN THE NNTeB OF JUPITER

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ABSTRACT

During two consecutive apparitions of Jupiter, 1968-69 and 1969-70, 12 and 9 spots were observed by Reese (1970) in the NNTeB (latitude about 35°N). His drift curves are here extended on the basis of LPL Jupiter photographs. It is shown that the two source areas for these groups of spots are probably the same, and define a rotation period of the common subsurface source very close to that of System III.

The North North Temperature Current B, occurring at Zenographic latitude +35° and having a rotation period of about 9^h54^m, is occasionally observed when dark spots form on the South edge of the NNTeB and move rapidly in the direction of decreasing longitude. This current was first observed by Hargreaves in 1929-30, was next seen during five consecutive apparitions from 1940 to 1945 (Peek 1958), and was not seen again until 1965 (Reese and Solberg 1969).

A summary of recent NNTeB activity is found in the following table:

Apparition	No. of spots observed	Mean Period
1965-66	2	$9^h53^m52^s$
1966-67	-	-
1967-68	1	9 53 45
1968-69	12	9 53 50
1969-70	9	9 53 50
1970-71	Faint	-

This paper deals with the 21 spots observed in 1968-69 and 1969-70.

The twelve spots of 1968-69 were all first observed near longitude (II) 60° (Fig. 1*a*), and Reese (1970) suggested their origin to be a subsurface source rotating with a period nearly the same as that of System II. This activity continued into the next apparition. The observed spots again had a non-random distribution, this time forming near longitude (II) 0° (Reese 1971); cf. Figure 1*b*. Only a few faint diffuse spots were observed the next year (1970-71), and it was not possible to obtain drifts for them.

The position of the hypothetical subsurface source proposed by Reese can be inferred from the longitudes at which the NNTeB spots were first observed. Since the spots drifted rapidly in longitude at the rate of $-2.^\circ7$ per day and since the area of formation was not continuously observed, the position of the source is somewhat uncertain, though its longitude should be equal to or greater than the longitude at which the NNTeB spots were first observed. Furthermore, since there are many photographs showing longitudes where NNTeB spots do *not* exist, it seems reasonable to assume that the area of highest probability for the source would extend about 20° in longitude immediately following the area where the NNTeB spots were first seen.

The position of the subsurface source would be more accurately known if the NNTeB spots were observed immediately after they formed. To get a better idea of the longitudes of formation, I used the LPL collection of Jupiter photographs to extend back in time Reese's original observations.

The longitude at which each NNTeB spot was first observed was then plotted against time (Fig. 1*c*); a least-squares line through these points gives a rotation of $9^h55^m33^s.9 \pm 0^s.8$ (s.d.). A reasonable drift for the subsurface source was inferred from the indivual spots; it has a period of about $9^h55^m32^s$.

It is interesting to note that the hypothetical subsurface source had a rotation period close to that of System III ($9^h55^m29^s.7$). The prominent NNTeB activity did not continue for a third apparition.

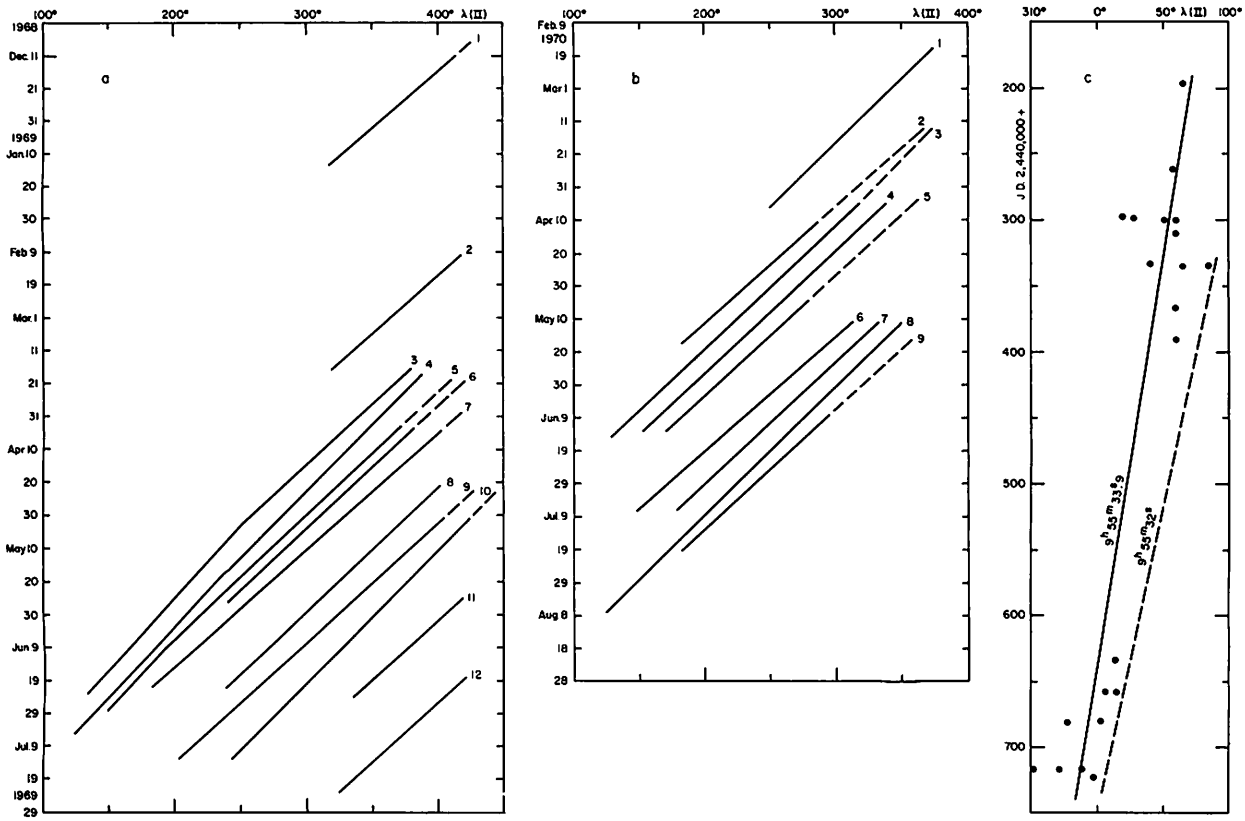

Figure 1*a* S/NNTeB drifts observed during 1968-69. Solid lines: drifts observed by E. J. Reese at NMSU; dashes: extensions using LPL photographs.

1*b* S/NNTeB drifts observed during 1969-70. Solid lines: drifts observed by Reese at NMSU; dashes: using LPL photographs.

1*c* Longitudes at which NNTeB spots were first observed vs Julian date. Solid lines: least-squares solution; dashed line: inferred drift of subsurface source.

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